

Patent Claims

1. A storage and retrieval unit (1) for transporting goods (2) from or into a shelf (3) in a commissioning system, with a vertical mast (4) and with a longitudinal drive (5) connected to the mast for longitudinal displacement and longitudinal positioning of the storage and retrieval unit at a site of operation of the shelf on the shelf front or the shelf rear, wherein a height-adjustable goods receiver (7) is provided at the vertical mast, characterized in that the mast is designed as an articulated mast (4) and has at least one said joint (8), which makes possible a deflection (A) of the articulated mast in the direction of longitudinal displacement (L), and that a guide/readjusting device (9) with articulated rods, especially an articulated oscillating crank (9'), which returns the articulated mast into the normal position during a guided deflection (A) of the articulated mast (4) from the vertical normal position (N), is provided for stabilization at the deflectable longitudinal end of the articulated mast.

2. A storage and retrieval unit in accordance with claim 1, characterized in that the joint (8) is located in the area of the longitudinal drive (5).

15 3. A storage and retrieval unit in accordance with claim 1 or 2, characterized in that the longitudinal drive (5) is arranged in the area of an upper or lower mast end, in particular, the articulated mast (4) is suspended on an upper chassis (12) or is supported at a lower chassis (13).

4. A storage and retrieval unit in accordance with one of the claims 1 through 3, characterized in that the guide/readjusting device (9) has another longitudinal drive (6) in the manner of the

longitudinal drive (5), and the two longitudinal drives (5, 6) are preferably operated synchronously.

5. A storage and retrieval unit in accordance with claim 4, characterized in that the two longitudinal drives (5, 6) are operated synchronously such that the articulated mast (4) is arranged vertically during the normal operation of a longitudinal displacement of the storage and retrieval unit (1), and that guided deflection (A) of the articulated mast (4) takes place in case of an emergency stop of the storage and retrieval unit.

6. A storage and retrieval unit in accordance with one of the claims 1 through 5, characterized in that the guide/readjusting device (9) comprises an elastic readjusting means.

7. A storage and retrieval unit in accordance with one of the claims 1 through 6, characterized in
10 that the goods receiver (7), which is adjustable in height at the articulated mast (4), is located in the area of the joint (8) for the longitudinal displacement (L) of the storage and retrieval unit to a site of operation of the shelf on the shelf front or on the shelf rear.

8. A storage and retrieval unit in accordance with one of the claims 3 through 7, characterized in that the upper and/or lower chassis (12, 13) is/are guided in a nontilting manner in rails (10).

15 9. A storage and retrieval unit in accordance with claim 8, characterized in that the rails (10) are integrated parts of the shelf (3).

10. A storage and retrieval unit in accordance with one of the claims 3 through 9, characterized in that the chassis (12 or 13) has at least four axes with said end-side rollers (14), which are guided in said rails (10) in a nontilting manner, wherein two axes each are arranged as an axis pair one on top of another and the two axis pairs are located at horizontally spaced locations from one another at a short distance (d), preferably at a distance (d) corresponding to 2 to 3 times the diameter of the roller (14).

11. A storage and retrieval unit in accordance with claim 10, characterized in that the chassis (12 or 13) has an electric drive (18) of its own with a friction wheel (17) as a driving wheel, which meshes with one of the rails (10) in a rolling-driving manner.

10 12. A storage and retrieval unit in accordance with one of the claims 1 through 11, characterized in that the articulated mast (4), especially the joint (8), has a blocking device, which prevents deflection (A) of the articulated mast up to a mast load limit value and permits deflection (A) of the articulated mast (4) when the mast load limit value is exceeded.

15 13. A storage and retrieval unit in accordance with claim 12, characterized in that the mast load limit value can be set.

14. A storage and retrieval unit in accordance with claim 12 or 13, characterized in that the mast load limit value is a lateral force limit value of the articulated mast (4) or an acceleration/deceleration limit value of the longitudinally displaceable storage and retrieval unit.

15. A storage and retrieval unit in accordance with one of the claims 1 through 14, characterized in that the guide/readjusting device (9) comprises, especially instead of the articulated rods or the oscillating crank, a bent guide, especially a sliding guide with lateral sliding blocks at the deflectable end of the articulated mast, which makes possible an exact bent guiding of the 5 deflectable end of the articulated mast during unhindered deflection of the articulated mast along the arc and clearance-free guiding in the transverse direction.

16. A method for longitudinally positioning the storage and retrieval unit at a site of operation of the shelf (3) in accordance with one of the claims 1 through 15, characterized in that the longitudinal drive or said longitudinal drives (5, 6) is/are operated such that the articulated mast 10 (4) is arranged vertically during normal operation of a longitudinal displacement of the storage and retrieval unit (1), and that guided deflection (A) of the articulated mast (4) and guided returning takes place in case of an emergency stop of the storage and retrieval unit.

17. A method for longitudinally positioning the storage and retrieval unit at a site of operation of the shelf (3) in accordance with one of the claims 1 through 4 and 6 through 14, characterized in 15 that the storage and retrieval unit (1) is displaced linearly in the longitudinal direction (L) of the shelf from a resting starting position of the shelf (3) in an accelerated manner to a selected site of operation of the shelf and in a decelerated manner before the site of operation is reached in such a way that the articulated mast (4) is deflected in a guided manner during at least part of the accelerated and/or decelerated motion and is again returned in a guided manner into the aligned 20 vertical normal position at least during stoppage of the storage and retrieval unit.